ATTACHMENT A

SAMPLING PLAN

SAMPLING PLAN FOR THE RFA SAMPLING VISIT
CARIBBEAN GULF REFINING CORPORATION (CARECO)
BAYAMON, PUERTO RICO
EPA ID NO. PRD00632182

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1.0 INTRODUCTION

As part of the Corrective Action Program outlined in the 1984 Hazardous Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act (RCRA), the U.S. EPA is conducting assessments of all operating, closed, or closing hazardous waste facilities. Consequently, the agency has established a RCRA Facility Assessment (RFA) to identify releases or likely releases requiring further investigation. The RFA process includes three main components: (1) the Preliminary Review (PR), (2) the Visual Site Inspection (VSI), and (3) the Sampling Visit (SV). The SV is performed in cases where EPA determines that the results of the PR and VSI indicate that sampling is warranted at specific solid waste management units (SWMUs) and/or other areas of concern.

The PR and VSI have been completed for the CARECO facility located in Bayamon, Puerto Rico, and EPA has determined that a SV is warranted. EPA has requested the A. T. Kearney Team to conduct the SV for this facility and to prepare an RFA sampling plan for this activity.

This document details the proposed procedures, rationale, and logistics for sampling soil associated with the SWMUs or areas of concern at the CARECO Sun Oil facility. The document has been prepared using information from the November 1988 PR and VSI, which were performed as part of the RFA.

This SV will be conducted to determine the suspected release potential associated with the SWMUs and other areas of concern. The results of the SV are intended to support decisions regarding the need for further actions at the facility. The results are not intended to represent a detailed characterization of contamination at the facility or to lead to a statistical inference.

This RFA sampling plan addresses the activities to be carried out by the sampling team during the SV at the CARECO facility. The existing background data for the facility have been collected and evaluated. Sources of this

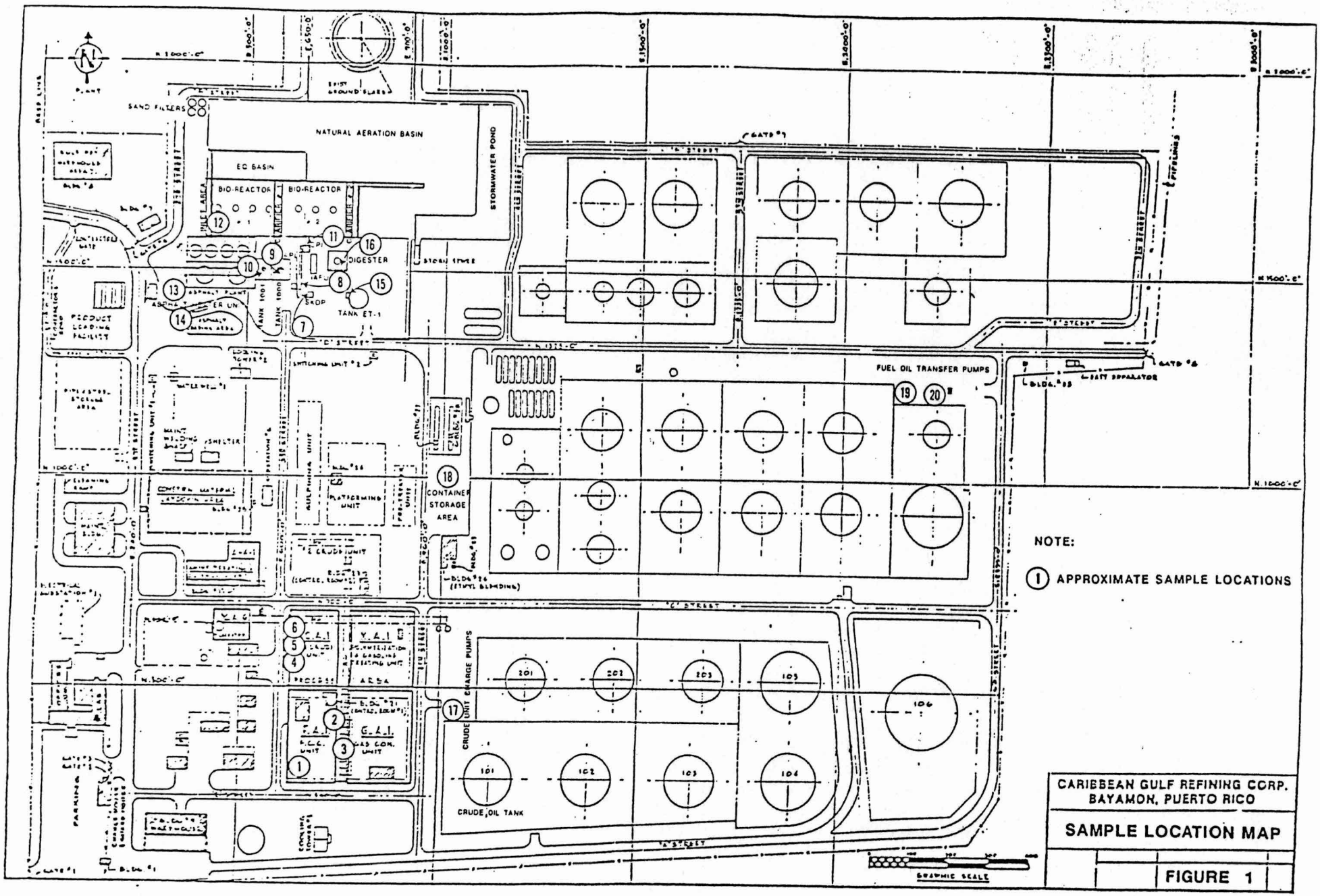
information include records and files from the EPA Regional office in New York, and the Puerto Rico EQB office in San Juan. Areas of the facility were identified by the PR/VSI team which require sampling. The locations of these areas are indicated on Figure 1. These areas either presently receive hazardous waste, have been identified as areas of past or present hazardous waste management activities, or have been identified as areas having potential for release of hazardous wastes or hazardous constituents.

The SV will involve the following activities:

1. Preparing the sampling and safety plan;
2. Scheduling of the SV with EPA Region II and Puerto Rico EQB personnel;
3. Notifying the owner/operator of the SV; determining if split samples will be requested; discussing options for disposal/treatment of hazardous waste generated during the SV;
4. Meeting with plant personnel to discuss sampling locations and conducting a presampling visit (PSV);
5. Conducting the SV; and
6. Preparing the final SV report.

This sampling plan has been prepared to provide guidance for all SV field activities and to ensure that all sampling procedures are in accordance with EPA protocol. Any deviations from this sampling plan during the sampling event will be based on the judgment and approval of the EPA Technical Monitor or representative and/or the quality control inspector present on-site, and will be recorded in the field logbook.

The subsections of this document establish the procedures which will be followed during the SV. The Introduction defines the SV and its role as part of the RFA program. The section on Project Organization lists the parties responsible for each part of the SV. The Site Background section provides a


NATURAL AERATION BASIN
EQ BASIN
BIO-REACTOR
BIO-REACTOR
SAND FILTERS
STORMWATER POND
DIGESTER
TANK ET-1
PRODUCT LOADING FACILITY
FUEL OIL TRANSFER PUMPS
CONTAINER STORAGE AREA
CRUDE OIL CHARGE PUMPS
CRUDE OIL TANK
PROCESS AREA
PIPELINES
NOTE:
(1) APPROXIMATE SAMPLE LOCATIONS
CARIBBEAN GULF REFINING CORP.
BAYAMON, PUERTO RICO
SAMPLE LOCATION MAP
FIGURE 1

brief description of site background and current activities. The Sampling Criteria section describes the media to be sampled, sampling density, and the choice of parameters for analysis. The sampling methodologies that will be used during the SV are presented in the Sampling Procedures section. The document also includes a Sampling Quality Assurance section and a health and safety plan.

2.0 PROJECT ORGANIZATION AND PERSONNEL REQUIREMENTS

Table 1 depicts the project management, organization, and personnel requirements for the CARECO SV. It includes the name, affiliation, functional title and a brief description of the responsibilities of the SV personnel.

Table 1

Project Organization and Personnel
Requirements for the CARECO SV

Name	Affiliation	Title	Brief Description of Responsibilities
John Gorman	U.S. EPA	EPA Technical Monitor	- Schedule sampling visit - Interact with facility owner/operator - Provide regulatory input - Approve sampling plan - Assist in sampling guidance QC
Gayle Kline	A. T. Kearney	Technical/Director Work Assignment Manager	- Overall project management - Provide staff
Shawn DeLorey	A. T. Kearney	Work Assignment Manager, Field QC Officer	- Overall management of SV - Project manager
Elani Gray	Harding Lawson Associates	Field Team Leader	- Supervise sampling activities - Review SOP - Coordinate health and safety plan - Supervise development of SV report
K. C. Donnelly	K. W. Brown & Associates	Field QC Officer	- Ensure field activities are conducted in accordance with sampling plan and health and safety plan
Joan Middleton Doulgas Ucci David Perez Kathy Farr	Harding Lawson Associates	Sampling Technicians	- Perform designated field activities (e.g. sampling, decontamination) - Assist in the development of SV report

3.0 SITE BACKGROUND

The Caribbean Gulf Refining Corporation (CARECO) facility is located within the Luchetti Industrial Park in Bayamon, Puerto Rico. This facility is a refining plant which started operation in 1955 under the name Caribbean Refining Corporation. In 1962, the facility was purchased by Gulf Oil Corporation and the name was changed to Caribbean Gulf Refining Corporation. In 1984, Chevron purchased all assets of Gulf Oil Corporation. On September 1, 1987, Chevron sold its assets to First Oil International making the facility an independent refinery now called Caribbean Petroleum Corporation.

The facility utilized crude oil as feedstock in processes including crude distillation, vacuum distillation, fluid catalytic cracking, and catalytic reforming. The facility has a refining capacity of 38,000 barrels per day, however, the refinery has been temporarily shutdown since March 4, 1988 due to economic factors.

The hazardous wastes which were identified on CARECO's Part A Application as being generated include slop oil emulsion solids (K049), heat exchanger bundle cleaning sludge (K050), API separator sludge (K051), tank bottoms (leaded) (K052), ignitable (D001), corrosive (D002), reactive (D003) and toxic (D000). Waste from the Induced Air Flotation Unit float (K048) is also generated and mixed with recovered slop oil which are recycled back into the refining process.

On August 5, 1980, the facility submitted an initial Notification of Hazardous Waste Activity followed on November 5, 1980 by a Part A Permit Application. On February 2, 1982, the facility sent EPA a letter requesting withdrawal of their Part A permit application, indicating they were a protective filer because wastes were not stored onsite more than 90 days. On October 22, 1982 and again on December 23, 1986 similar requests for withdrawal were made to the EPA, but support of its claim of storage of

hazardous wastes less than 90 days has not been verified. An EPA site visit on August 5, 1988 concluded that the facility did not qualify for protective filer status.

The facility has documented the presence of hydrocarbon contamination of the groundwater aquifer beneath the plant. This situation, according to file information, appears to be the result of past operational practices at the old gasoline loading area which has not been in use since 1976. Spills and overflows from nearby storage tanks were also mentioned as possible contamination sources. Groundwater monitoring wells were established as part of an mandated Action Plan submitted in March 1985 to the Environmental Quality Board (EQB). Subsurface product recovery was also undertaken as part of the Action Plan to recover hydrocarbons and has progressed through three phases, which included monitor well installation, hydrogeological studies, soil and groundwater sampling, and continued product extraction.

The CARECO facility has been inspected by the U. S. EPA and the Environmental Quality Board (EQB) in 1980 and 1981 after its Part A submittal with deficiencies found to exist regarding the facility's hazardous waste management activities. In May 1985, the EQB issued an enforcement order to CARECO directed at the investigation and remediation of documented groundwater contamination at the site. An inspection by the EQB in December 1985, continued to document noncompliance related to the hazardous waste storage facility and associated documentation and inspection procedures. EQB and U. S. EPA inspections in March and August, 1988 revealed noncompliant conditions associated with the hazardous waste storage and management activities as well as the operation of portions of the wastewater treatment facilities.

The site and surrounding areas are part of the old Bayamon river valley alluvium consisting of mixtures of gravel, silt, sand and clay which are underlain by a series of sedimentary limestone formations. The shallow

aquifer beneath the site receives recharge from areas located south of the refinery. Regional groundwater flow is to the north along bedding planes with groundwater discharges mostly via streams, marshes and springs located north of the plant.

4.0 SAMPLING CRITERIA

This section represents the sampling criteria used for this SV. These criteria include: (1) sampling locations, and (2) analytical parameters. Sampling locations address sample collection areas, specific sampling points, sampling media, density, depth, and the location of background sampling areas. The analytical parameters section describes the constituents for analysis and the special presampling preparation procedures.

4.1 Sampling Locations

The relative locations of the sample collection areas at the facility are shown in Figure 1 and the expected sampling approaches are described in Table 2. These sampling locations include:

1. Heat Exchanger Bundle (HEB) Spillage at Heavy Cycle Steam Generator near FCC

   The HEB's associated with the Heavy Cycle Steam Generator of the FCC unit are located at the north end of the process area upon a concrete slab with approximately four-inch perimeter concrete curbing. Spillage and accumulated rainwater drains to a sump then to the process sewer system. Hydroblast cleaning of these HEB's at their existing locations has resulted in the possible spillage of waste residues (K050) outside the curbing and soil noted during the VSI. Soil sampling of this area is proposed.

2. Debutanizer Reboiler Gasket Leakage

   The Debutanizer Reboiler is a section of the crude unit which is the initial step in the refining process. The gasket on the end of the Debutanizer Reboiler showed evidence of past failure resulting is leakage onto a portion of the concrete curbed base as well as on the adjacent ground surface. Hydroblast cleaning of this unit while at its existing location may have also resulted in soil contamination (K050) as observed during the VSI. Soil sampling of this area is proposed.

TABLE 2

SAMPLING STRATEGY
FOR THE RFA SAMPLING VISIT
AT THE CARIBBEAN GULF REFINING CORPORATION (CARECO) FACILITY

Locations to be Sampled[1]	Sample Medium	Rationale for Sampling	Number of Points to be Sampled	Sampling Method	Depths/ Types[2]	Selected Analytes[3]	Comments
1. Heat Exchanger Bundle (HEB) Spillage at Heavy Cycle Steam Generator near FCC Unit	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi volatile organics and, CLP target compound list metals	Soil staining was apparent during VSI
2. Gasket near Debutanizer Reboiler	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent during VSI
3. Lube Oil Gas Compressor Unit	Soil	Suspected of containing and releasing hazardous constituents	2	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent dur-VSI from runoff in the process area
4. Crude Unit #1 (near broken curbing)	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent dur-VSI from runoff in the process area
[a]Crude Unit #1 (near broken curbing)	Soil	Verify the analytical reproducibility of data	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent dur-VSI from runoff in the process area

TABLE 2 (continued)

SAMPLING STRATEGY
FOR THE RFA SAMPLING VISIT
AT THE CARIBBEAN GULF REFINING CORPORATION (CARECO) FACILITY

Locations to be Sampled[1]	Sample Medium	Rationale for Sampling	Number of Points to be Sampled	Sampling Method	Depths/ Types[2]	Selected Analytes[3]	Comments
5. Runoff near Crude Unit #1 HEB Spillage	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent during VSI from the practice of cleaning heat exchangers in this area
6. Piping at Crude Unit #1 near Heat Exchanger Bundles (HEB)	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent during VSI
7. Solids Knockout Pit (SKOP)	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining from overtopping was apparent during VSI
8. API Separator	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining from overtopping was apparent during VSI
[a]API Separator	Soil	Verify the analytical reproducibility of data	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining from overtopping was apparent during VSI

TABLE 2 (continued)

SAMPLING STRATEGY
FOR THE RFA SAMPLING VISIT
AT THE CARIBBEAN GULF REFINING CORPORATION (CARECO) FACILITY

Locations to be Sampled[1]	Sample Medium	Rationale for Sampling	Number of Points to be Sampled	Sampling Method	Depths/ Types[2]	Selected Analytes[3]	Comments
9. Tank 1000	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent during VSI
10. Tank 1001	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent during VSI
11. Corrugated Plate Interceptor (CPI)	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent and there was a strong hydrocarbon odor near this unit during VSI
12. Inlet Basin to Biological Reactor #1	Soil	Suspected of containing and releasing hazardous constituents	2	Scoop Grab	0-1', Beaker	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining from overtopping was apparent during VSI
13. Asphalt Heater Unit	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1',	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent during VSI
14. Loading Rack Pump Area	Soil	Suspected of containing and releasing hazardous	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent during VSI
15. Tank ET-1	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent during VSI

TABLE 2 (continued)

SAMPLING STRATEGY
FOR THE RFA SAMPLING VISIT
AT THE CARIBBEAN GULF REFINING CORPORATION (CARECO) FACILITY

Locations to be Sampled[1]	Sample Medium	Rationale for Sampling	Number of Points to be Sampled	Sampling Method	Depths/ Types[2]	Selected Analytes[3]	Comments
16. Digester	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent during VSI
17. Crude Unit Charge Pumps	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent during VSI
18. Fuel Oil Transfer Pumps near Tank 603	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent during VSI
19. Fuel Oil Transfer Pumps near Cummings Pump Area	Soil	Suspected of containing and releasing hazardous constituents	1	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	Soil staining was apparent during VSI
20. Background	Soil	Comparison Samples	3	Scoop	0-1'	Volatile and semi-volatile organics and, CLP target compound list metals	
21. Equipment Field Blanks	Water	QC Samples	3	Scoop (Knife, Bowl, Pan) Auger	Grab	Volatile and semi-volatile organics and, CLP target compound list metals	

1 Refer to Figure 1 for sample locations
2 See Table 3 for Preservation Methods and Holding Times
3 Samples Will Be Analyzed According to Standard Contract Laboratory Program (CLP) Protocols in Force 7-87 (inorganics) and 10-86 with revisions (organics)
a Duplicate Sample Locations

3. Lube Oil Gas Compressor Unit

The lube oil system associated with the gas compressor unit is located within the process area near the FCC unit. The lube oil system is located on a concrete foundation with drainage directed to the process sewer system. Soil staining was noted off the edge of the concrete foundation on the ground during the VSI indicating the possibility of soil contamination. Sampling of the soil adjacent to the stained concrete is proposed.

4. Crude Unit #1

The Crude Unit #1 is located in part on a concrete foundation with the unit being surrounded by perimeter curbing to contain any contaminated runoff and direct it to the process sewer system. On the west side of the unit, the perimeter curbing was fractured with portions missing. Oil staining outside the curbing onto the ground, as noted at numerous locations around Crude Unit #1 during the VSI, indicates the potential for soil contamination in these areas. Soil sampling of the stained areas are proposed.

5. Crude Unit #1 at Heat Exchanger Bundle (HEB) Area

The HEB's associated with Crude Unit #1 and located on the west side of the unit showed evidence that these HEB's had previously undergone maintenance work (i.e., hydroblast cleaning) at their existing location. These maintenance activities have resulted in possible waste residue spillage outside the curbed concrete base beneath the HEB's. Observation during the VSI showed oil staining immediately adjacent to the HEB's, with potential soil contamination resulting. Sampling of the soil in this area is proposed.

6. Crude Unit #1 Piping near Heat Exchanger Bundles (HEB)

Insulated process piping associated with a portion of Crude Unit #1 near the HEB's appeared to have previously leaked or undergone maintenance activity. The result being, a heavy oily accumulation on the underlying soil which is adjacent to a portion of the unit's concrete slab foundation. During the VSI this earthen area appeared saturated with accumulated oil leakage or spillage which may pose a potential for soil contamination. A soil sample is proposed to be collected from this area.

7. Solids Knockout Pit (SKOP)

This unit is a below grade concrete structure subdivided into chambers for the initial separation and settling of the process wastewater and contaminated stormwater. Vacuum trucks also discharge into this unit

as does excessive wastewater surge which is contained in Tank ET-1. Floating slop oil (K049) is sent to Tanks 1000 or 1001 for recycling and sludge (K051) is handled as hazardous waste and disposed of offsite by outside contractor. Oil staining was noted during the VSI around the vacuum truck discharge box and along the top wall of the SKOP resulting in potential contamination of adjacent soils. A soil sample is proposed to be collected adjacent to the SKOP.

8. API Separator (API)

The below grade concrete two-cell API Separator has an initial chamber called the primary bay which receives water from the SKOP, Tanks 1000 and 1001, as well as the Digestor. Floating slop oil (K049) is returned to Tanks 1000 and 1001 via a suction sump which abuts the API Separator. Water flows to the corrugated Plate Interceptor (CPI). Sludge removed from the API Separator (K051) is disposed of as hazardous waste by outside contractor. Oil staining was noted during the VSI around the perimeter of the primary bay and up and over the sidewalls of the API Separator where sludge is routinely removed. Potential contamination exists in these areas of staining. A soil sample is proposed to be collected from this area.

9. Slop Oil Tank 1000

Tank 1000 is a closed-roof, carbon steel tank which is 15 feet in diameter and 18 feet in height. It has a capacity of approximately 21,000 gallons. Slop oil (K049) is received from the SKOP, API and CPI. This tank is located on a concrete foundation and is surrounded by earthen dikes approximately three-foot-high. Oil staining and small pools of oil were noted during the VSI on the ground around the base of the tank beneath the transfer piping and associated values either due to maintenance activities or leakage. A soil sample is proposed to be collected in this area.

10. Slop Oil Tank 1001

Tank 1001 is fixed-roof, carbon steel tank which is 15 feet in diameter and 18 feet in height. It has a design capacity of 21,000 gallons. Slop oil (K049) is received from the SKOP, API and CPI. This tank is on an earthen base surrounded by approximately three foot-high earthen dikes. Oil staining and small pools of oil were noted during the VSI on the ground around the base of the tank beneath the transfer lines and associated values either due to maintenance activities or leakage. A soil sample is proposed to be collected.

11. Corrugated Plate Interceptor (CPI)

The below grade concrete CPI receives water from the API Separator. The slop oil (K049) recovered in this unit is accumulated in an associated sump pit from where it is pumped into Tanks 1000 and 1001. Oil staining up and over the walls of the CPI onto the ground was noted during the VSI due to operational practices, which may pose potential soil contamination. Soil sampling is proposed for the area adjacent to the CPI.

12. Inlet Basin to Biological Reactor #1

This Inlet Basin is an unlined earthen impoundment which receives water from the Equalization Basin prior to entering the adjacent concrete Biological Reactor #1. Slop oil (K049) is skimmed off the water surface and collected via vacuum truck with the water flowing over a concrete wall into the aerated Biological Reactor #1. Oil staining was noted along the earthen walls of this inlet area during the VSI. A soil sample from this Inlet Basin is proposed due to potential contamination.

13. Asphalt Heater Unit

The Asphalt Heater Unit is utilized for the transfer of asphalt from the asphalt storage tanks to the transport vehicles. Hardened asphalt spillage was noted around the base of the unit and on the adjacent surrounding ground surface during the VSI. A soil sample from this area is proposed to be collected.

14. Loading Rack Pump Area

The Loading Rack Pump Area is associated with the transfer of fuel oil via pumps from the facility into transport vehicles. The associated lines are elevated and supported by concrete foundations beneath which was noted accumulated fuel oil on the ground surface. This area is designed to drain back into the wastewater treatment plant via the process sewer system. The VSI indicates sloppy management practices and a soil sample is proposed to be collected from this area.

15. Tank ET-1 and Sump

Tank ET-1 is a surge tank for process wastewater discharging to the SKOP. This fixed roof, carbon steel tank drains to an associated concrete sump connected by underground piping to the SKOP. Oil staining was noted during the VSI on the ground around this sump, trailing down a small incline adjacent to the tank. A soil sample within this area is proposed.

16. Digestor

The Digestor, which is of concrete construction, receives excess sludge and some oily wastewater from the Biological Reactors. The water is pumped to the API Separator, while the sludge is indicated as being nonhazardous and sent offsite to a municipal landfill. Oil staining was noted during the VSI outside the concrete retaining walls on the ground beside the transfer lines and pumps. Due to potential contamination, a soil sample is proposed to be collected from the stained area.

17. Crude Unit Charge Pumps

The Crude Unit Charge Pumps which transfer the feedstock from the various crude oil storage tanks into the crude units are located on a concrete foundation surrounded by approximately eight-inch concrete curbing. Drainage from within this area is designed to drain to the process sewer system and thus to the wastewater treatment plant. During the VSI crude oil pipeline was observed penetrating the perimeter diking which allowed oil to flow outside the containment structure onto the adjacent ground surface. A soil sample from the area outside the concrete curbing is proposed.

18. Fuel Oil Transfer Pumps Near Tank 603

The Fuel Oil Transfer Pumps are located in an area adjacent to Tank 603. The area is constructed atop a partially curbed concrete base connected to the process storm sewer system. Areas beneath some of the fuel oil transfer piping and valves appear earthen and contained pooled fuel oil and accumulated rainwater. The VSI indicates sloppy management practices and a soil sample is proposed to be collected from this area.

19. Fuel Oil Transfer Pumps Near Cummings Pump Area

The Fuel Oil Transfer Pumps, which utilize Cummings diesel pumps and are also located adjacent to Tank 603, are situated atop a curbed concrete base. Cracks in the base and curbing allowed fuel oil drainage onto the adjacent ground surface. The VSI indicates sloppy management practices and a soil sample is proposed to be collected from the area adjacent to the concrete curbing.

Presently, there are no factors identified which might influence the sequence by which identified locations are sampled, or establish a hierarchy of sampling locations. The collection of samples will be based on the judgment of the sampling team in consideration of the most efficient and effective routes.

4.1.1 Identification of Sampling Points

The sampling locations listed above are areas where sampling has been determined to be warranted. Specific sampling points within each sampling area will be selected during the SV based on field observations of soil conditions, topography, or any visual evidence of contamination or likely routes of waste migration.

4.1.2 Sampling Media

At present, it is expected that the only media from which samples will be collected is soil.

4.1.3 Sampling Density

The sampling density is delineated in Table 2. The field team, in conjunction with the EPA Technical Monitor or representative on site, may determine that an expanded sampling density is necessary at certain locations based on in-field observations. The equipment carried by the sampling team will therefore include provisions for sampling at increased sampling densities.

4.1.4 Sampling Depth

Surface soils will be sampled at each location from a depth between zero and one foot. This depth has been selected to determine if surface runoff of hazardous constituents has occurred. The exact depth of the soil samples may

vary because of soil conditions, or visible contamination present. If, during the SV, field observations warrant collection of subsurface samples, subsurface soil collection may be conducted according to procedures outlined in this document.

4.1.5 Location of Background Sampling Areas

If appropriate, background air samples will be collected immediately upwind of the container storage area and corrugated plate interceptor.

Three background soil samples will be collected from areas of the CARECO facility that have been determined to be free of contamination. The depths of the background soil samples will be from zero to one foot as delineated in Table 2.

4.2 Analytical Determinations

This section describes the choice of parameter(s) for analysis and the special preparation for sampling needed in consideration of the wastes being managed at the facility. All samples will be analyzed for volatile and semi-volatile organics, and CLP target compound list metals as delineated in Table 2.

4.2.1 Choice of Parameters for Analysis

The hazardous waste being managed at this facility include AFU float (K048), slop oil emulsion solids (K049), heat exchanger bundle cleaning sludge (K050), API Separator sludge (K051), tank bottoms (leaded) (K052), ignitable waste (D001), corrosive waste (D002,) and toxic waste (D000). These wastes contain organic and inorganic constituents (including hexavalent chromium and lead).

4.2.2 Special Presampling Preparation

There are no unique conditions at this facility that warrant special presampling preparation for the RFA SV.

5.0 SOIL SAMPLING PROCEDURES

The sampling methodologies discussed in this document cover the media of interest (soil, sludge and air) at the CERECO facility. These methodologies have been selected on the basis of practicality, economics, representativeness, comparability with analytical considerations, and safety. In addition to specific sampling procedures, quality control procedures specific to the sampling medium are included. Quality assurance procedures applicable to all sampling media (e.g., sample handling and transportation, chain-of-custody procedures, and decontamination), are presented in Section 6.0. All sampling methods and materials address the needs and concerns that arise during SVs. The references that were used to prepare this section include but are not limited to: Characterization of Hazardous Waste Sites, A Methods Manual, Volume 2, Available Sampling Methods, EPA 600/4-84-076, December 1984; and, Test Methods for Evaluating Solid Waste: Chemical/Physical Methods EPA SW-846, July 1982.

The only sampling medium that will be addressed during the CARECO facility SV is soil. Soil samples at the CARECO facility will be collected using a sampling kit composed of equipment capable of operating in the specific soil conditions expected to be encountered at this site. This equipment kit includes bucket auger samplers and tools (scoops and knives) specifically designed to facilitate sampling in different soil textures and to facilitate sample transfer. Hand-operated sampling equipment will be used to obtain samples at this facility. All sampling equipment will be constructed of stainless, Cr-Mo steel, or other materials which do not compromise analytical integrity.

In situations where biased conditions (e.g. discolored soil, dead vegetation) are not apparent, soil sampling sites may be identified following collection of a series of exploratory soil samples from within the general sampling location. The field team leader in conjunction with the EPA Technical Monitor, or EPA representative present on-site, will visually inspect the exploratory soil samples cores to determine the exact soil sampling depths to be used for laboratory analysis. Once this determination has been made, soil samples will be collected as described below for standard soil sampling procedures.

Surface soil samples are planned for the CARECO SV. However, if field observations warrant the collection of subsurface soils, a bucket auger will be used as described below for subsurface sampling procedures.

Detailed soil sample information will be collected during the sampling operation. The information recorded will include depth of sample, description of sample including texture of soils, soil horizons, discolorations, and any odors. This information will be recorded in the field logbook.

5.1. Surface Soil Sampling Procedures

1. Monitor the air adjacent to the sampling location with an HNu to determine the potential for hazardous conditions or toxic effects on workers.

2. Using a stainless steel trowel, clear the area to be sampled of any surface debris or cover material.

3. Begin collecting soil sample using a pre-cleaned, stainless steel scoop. Collect VOA samples directly from the first scoops and place into appropriate VOA vials. Use stainless steel spatula or knife only to pack soil.

4. Place the remaining sample into a glass or stainless steel pan and homogenize* thoroughly. Place the sample into the appropriate sample container(s).

5. Check that a teflon liner is present in the cap, if required. Secure the cap tightly. The chemical preservation of solids is not generally recommended. However, they must be cooled to 4°C.

6. Label the sample bottle with the appropriate sample tag. Be sure to label the tag carefully and clearly, addressing all categories and parameters.

7. Wrap each sample container in a clean plastic bag and place in a clean plastic cooler with ice.

8. Refill the hole from which the sample was collected with the remaining excavated soil.

9. Complete all chain-of-custody documents.

10. Record sample information in the field logbook.

5.2. Subsurface Soil Sampling Procedures

1. Monitor the air adjacent to the sampling location with an HNu to determine the potential for hazardous conditions or toxic effects on workers.

2. Attach the pre-cleaned auger bit to a drill rod extension and further attach the "T" handle to the drill rod.

3. With a stainless steel trowel, clear the area to be sampled of any surface debris or cover material.

*Homogenize - mix contents of sampler and/or individual grabs composing a sample in order to minimize bias of sample representativeness introduced by the stratification of constituents within the sample. To homogenize a sample of soil/sediment matrix, first remove any rocks, twigs, leaves and other debris if they are not part of the sample. The soil/sediment is removed from the sampling device and placed into a glass or stainless steel pan. The sample is then thoroughly mixed using a stainless steel spoon. The sample should be scraped from the sides, corners and bottom of the pan, rolled to the middle of the pan and initially mixed. The sample should then be quartered and moved to the four corners of the pan. Each quarter is to be mixed individually and then rolled to the center of the container and the entire sample mixed again.

4. Begin drilling, periodically removing accumulated soils to prevent accidently brushing loose material back down the borehole when removing the auger or adding drill rods.

5. After reaching the desired depth, slowly and carefully remove the auger from the boring.

6. Decontaminate the auger bit or remove it and attach a pre-cleaned auger bit.

7. Place the auger into the hole and collect the sample.

8. Remove the sample from the auger with a pre-cleaned stainless knife or scoop. Collect VOA samples directly from the first soil collected and place into appropriate VOA vials. Use a stainless steel spatula or knife only to pack soil. Place the remaining sample into a glass or stainless steel pan and homogenize as described in Section 5.1.1. Place the sample into the appropriate sample container(s).

9. Check that a teflon liner is present in the cap, if required. Secure the cap tightly. The chemical preservation of solids is not generally recommended. However, they must be cooled to 4°C.

10. Label the sample bottle with the appropriate sample tag. Be sure to label the tag carefully and clearly, addressing all categories and parameters.

11. Wrap each sample container in a clean plastic bag and place in a clean plastic cooler with ice.

12. Refill the hole from which the sample was collected with the remaining excavated soil.

13. Complete all chain-of-custody documents.

14. Record sample information in the field logbook.

5.3 Soil Sampling Quality Control

1. Detailed soil information will be collected during the sampling operation. The information recorded will include depth of sample, and description of the sample including texture of soils, soil horizons, discolorations, and any odors. This information will be recorded in the field logbook.

2. Each sample area and sampling activities will be photographed.

3. All personnel participating in the soil sampling will have training and experience in proper sampling procedures, documentation, and safety, specific to the RFA program.

6.0 SAMPLING QUALITY ASSURANCE

The purpose of the SV is to support a determination of release potential associated with specific SWMUs and other areas of concern. The results of the SV are intended to support decisions regarding the need for further actions at the facility. The results are not intended to represent a detailed characterization of a release of hazardous constituents at the facility or to lead to a statistical inference. The data generated will provide a "snapshot" of the condition of the media sampled at the time of sampling. Data will not be generated over an extended time period to show variations due to seasonal or other factors. Samples will either be collected from locations where the likelihood of a release cannot be determined from the PR/VSI, or will be collected to provide additional site-specific information for EPA.

Procedures for field sampling must consider data quality objectives, the field instrumentation and testing, decontamination and disposal, sampling blanks, sample preservation and handling, recordkeeping, documentation, transportation, presentation of data, and interpretation of results.

6.1 Data Quality Objectives

The data quality objectives for the RFA SV are defined in terms of accuracy, precision, representativeness, completeness, and comparability of data. These objectives are developed through two phases: (1) the field sampling visit phase, and (2) the laboratory analysis phase.

6.1.1 Accuracy

Accuracy is defined as how closely observed values conform to true values. Therefore, performance evaluation samples will be used to monitor accuracy. Performance evaluation samples will consist of blanks and laboratory-prepared spiked samples for the analyte(s) being investigated.

These samples will be prepared on a waste specific basis to mimic the expected composition of the environmental samples as closely as possible. The accuracy objectives for quantitative analysis will be expressed in terms of percent recovery of analytes comprising the performance evaluation samples.

Recoveries for the performance evaluation samples must fall within the ranges of recovery set forth in the Contract Laboratory Program manual. If recovery falls outside of this range, the analysis will be repeated. If recoveries are still out of this range, analyses must be terminated until the problem is identified and corrected or a reasonable explanation provided. Otherwise, all samples associated with the noncompliance performance evaluation sample must be reanalyzed. Laboratory data will be plotted on control charts to monitor analytical accuracy.

6.1.2 Precision

Precision measures the replicability and repeatability of results obtained from analyzing samples. Duplicate field samples will be collected and precision monitoring will be employed by the analytical laboratory. Analytical precision will be monitored using results from duplicate surrogate and matrix spikes. Laboratory precision goals for the various surrogate compound fractions will be developed using control charts, and expressed as relative percent difference (RPD).

6.1.3 Representativeness

The representativeness of samples collected during the RFA SV will be ensured in two ways. First, all field sampling will be done as outlined in the section referring to specific sampling procedures. Any modifications to these procedures will be recorded in the field logbook. All sampling procedures will be in accordance with established EPA guidelines and

procedures outlined in this document. These guidelines and procedures have been developed to promote consistency in environmental sampling efforts, to help ensure that proper sampling and sample handling procedures are followed, and proper equipment is used.

In addition, facility background information will be evaluated to determine the potential of a release from the SWMUs and other areas of concern located on-site. Before sampling activities are undertaken, the RFA, PR/VSI reports, and any additional pertinent information will be thoroughly evaluated to identify the following:

1. The likelihood of release from each of the facility SWMUs;
2. Past performance records (e.g., compliance files, inspection reports, NPDES data);
3. Sensitive areas (e.g., toe slopes, depositional areas, discolored soil);
4. The design and construction of groundwater monitoring wells or other sampling sources; and
5. The existence of sampling constraints.

Consideration of this information in the sampling effort will aid in collecting RFA samples that are representative of the facility being assessed.

6.1.4 Completeness

Completeness for the RFA SV will be monitored by qualitative and quantitative means. A qualitative assessment will be made by comparing the results of the PR/VSI report and SV with the objectives and procedures for field sampling that have been developed for the RFA program. This assessment will determine, on a qualitative level, which objectives are met and which are not. Ultimately, the regulatory agency will determine completeness (i.e., whether additional samples need to be collected).

6.1.5 Comparability

Data will be generated under the RFA SV based on established EPA sampling guidelines. The protocols used in the collection of field samples involving equipment, preparation, preservation, handling, reporting, chain-of-custody, and documentation will ensure comparability with other EPA field sampling programs. Site-specific sampling will be planned and conducted in accordance with the general sampling guidelines developed for RFAs, including input and approval from the regulatory agency.

6.2 Field Instrumentation and Testing

In the event that portable instrumentation and/or analysis kits are brought on-site to provide immediate field testing, the QA measures that are employed will account for the conditions which may influence operating procedures, and hence, data quality. Therefore, standard QA procedures that are utilized for field testing involve the following:

Documentation of Sampling Site - The location and prevailing conditions of a sampling site may affect the analytical results obtained during field testing. For example, the terrain in which a field sampling point is located, or the existence of permanent structures/processes located adjacent to field sampling sites may impact analytical results. In addition, daily weather patterns (e.g., windy conditions), and seasonal trends (e.g., operating temperature) can impact analytical results. Therefore, documentation of the sampling site location and condition is warranted. The location of all sampling sites will be documented (e.g., benchmarks, photographs) in the sampling logbook, and prevailing conditions will be recorded and further verified (whenever possible) through photography.

Sampling/Analytical Methodology - The portable field kits used to provide field analytical results must be compatible with the conditions of the required sampling event. All probes, collection devices, and storage containers that are included as part of a specific field analysis kit will be evaluated to ensure that site-specific conditions or contaminants do not impact the analytical results. The field methodologies will be assessed for any additives/preservatives which could impact the analytical results.

Instrumentation - Only those analytical instruments that are recognized as field portable will be used for performing field analyses. Manufacturer's instructions concerning specific calibration and standardization techniques and preventative and remedial maintenance measures will be utilized. A copy of the calibration procedures will be available in the field for quick reference. Equipment will be calibrated in the field prior to use and during the SV. An equipment calibration record will be maintained in the field logbook. This record will include details on every field calibration technique which is utilized. At a minimum, these details will include:

1. Equipment type and brand name;

2. Equipment identification number;

3. Initial reading before calibration;

4. Final reading after calibration (as an example, for equipment such as pH meters, record the pH of the buffer used for single point calibration and readings on at least two other buffers); and

5. Air temperature (a 5 to 10 degree change in ambient air temperature from that of initial calibration is reason for recalibration of some instruments).

The HNu photoionization meter will be calibrated once according to manufacturer's instructions, in the laboratory prior to shipment. The HNu will be zeroed to background prior to each day of field activities.

6.3 Decontamination and Disposal

All equipment used in the site sampling effort will be initially decontaminated by the laboratory and will be ready for use prior to site entry. The decontaminated equipment will be packaged to protect it from exposure. All equipment will be wrapped in aluminum foil with the larger items wrapped with an additional plastic bag. A label stating the level of decontamination, date of decontamination, and initials of individual certifying decontamination will be attached to the protective package in such a way that the label will not be torn during unpackaging. A piece of equipment in a package with a torn label will not be used for sampling and will be considered contaminated. In order to prevent contamination of sampling equipment prior to use, a clean,

dedicated area (e.g., pickup truck, plastic sheet) will be established at each sampling location to prevent contaminated media from coming in contact with any sampling tools or equipment.

Except for the soil auger and electronic sounding instrument, dedicated sample collection equipment will be used for the CARECO SV. (1) All decontamination and subsequent use of decontaminated equipment will be documented in the field logbook. The following procedures will be used when decontamination is necessary.

6.3.1 Equipment Decontamination

All sampling equipment and associated equipment (e.g. scoops, knives, bowls, etc.) will be decontaminated in the laboratory prior to shipment and will be dedicated to each sample location. However, if field decontamination of equipment becomes necessary, it will be accomplished according to the following procedures:

1. Scrub equipment with a nonphosphate detergent wash using a soft bristle brush to remove any particulate matter or surface film;
2. Rinse equipment thoroughly (3 to 5 times) with tap water;
3. Rinse equipment once with a 10 percent nitric acid solution;
4. Rinse equipment thoroughly with tap water;
5. Rinse equipment once with methanol;
6. Rinse equipment once with hexane;
7. Rinse equipment thoroughly with reagent grade (analyte-free) deionized/distilled water;
8. Allow to air dry thoroughly; and
9. Wrap in aluminum foil.

(1) Equipment which is only used once during a sampling event. This equipment is returned to home base for decontamination, prior to reuse.

The following procedures will be used to decontaminate safety equipment such as respirators and boots which are susceptible to degradation by solvent rinsing.

1. Brush off loose dirt with soft bristle brush or cloth;
2. Rinse thoroughly with tap water;
3. Wash in nonphosphate detergent in warm water;
4. Rinse thoroughly with tap water;
5. Rinse thoroughly with reagent grade distilled/deionized water;
6. Air dry in dust free environment; keep articles out of the sun;
7. Store in plastic bags.

Decontamination of small sampling tools, such as soil scoops, knives and containers, is not required if the equipment is properly disposed of after use. Disposable sampling tools and waste products from field decontamination, such as waste rinse water and waste solvent, must be properly disposed of on-site in accordance with the disposal procedures of the facility or must be packaged for off-site disposal.

6.3.2 Disposal of Contaminants

Prior to the SV, the owner/operator will be contacted to establish on-site treatment/disposal options for waste generated during the SV. Contaminated disposable sampling equipment or tools (e.g., disposable scoops, gloves) and aqueous washdown solutions will be disposed of on-site in accordance with the disposal procedures of the facility. Contaminated equipment that is not amenable to on-site decontamination (e.g., clothing) will be effectively contained, removed from the site, and subsequently properly decontaminated/ disposed.

6.4 Sample Blanks

In order to verify that the sample collection and handling process has not affected the quality of the samples, trip and equipment/field sample blanks will be collected. The blanks will be submitted as other field samples with no obvious marks or labels.

6.4.1 Trip Blanks

Trip blanks will not be required for the sampling visits since only soil samples will be collected.

6.4.2 Equipment/Field Blanks

Equipment blanks will determine if contamination is introduced from the sample collection equipment following decontamination practices. Equipment blanks will be prepared by the field sampling team by filling the sample collection device with deionized or distilled analyte-free water (see Section 6.4.3) of known high purity (or passing this water through or over the sample collection device) and transferring this water to a sample container. After standardized decontamination procedures are conducted, one equipment blank will be prepared for each type of sample collection device used during the sampling visit (scoop, auger). The knife, bowl and pan used in mixing and transferring the sample will be combined into one blank. Appropriate aliquots will be prepared for each analytical parameter group under investigation.

These samples will be prepared in the field prior to sampling and will additionally serve as field blanks to determine if contamination is introduced from sample collection activities or the prevailing sampling environment.

6.4.3 Analyte-free Water Requirements

Region II requires that the distilled, deionized water used in preparation of trip and field blanks be analyte-free. Analyte-free means that the water will conform to CLP contract detection limits. Exceptions exist for common laboratory contaminants including three volatiles: methylene chloride, acetone and 2-butanone, and phthalates in the semi-volatile fraction. Concentrations less than 3-times the CLP contract detection limit are acceptable for these compounds.

The contractor can document the quality of the water used with submittal of laboratory certification for each source of distilled, deionized water used in trip/field blank preparation. If laboratory certification does not meet the above criteria, an alternative source will be used. If laboratory certification is not available, verification of water quality will be documented through collection of a reagent blank which will be analyzed for the full suite of TCL compounds (volatiles, semi-volatiles, pesticides/PCBs and inorganics). Reagent blanks are required for each water source used during a sampling event up to five days in duration. If sampling extends into a subsequent week(s), reagent blanks are required for each source, each week.

For the CARECO facility SV, distilled, deionized analyte-free water will be obtained from a certified laboratory. Prior to shipment of this water, it will be analyzed by the laboratory and a copy of the analytical data will be provided to the SV team.

6.5 Sample Preservation and Handling

Table 3 lists the containers and specific handling and preservation techniques to be used for soil samples collected at the CARECO facility.

Table 3

Preservation and Handling Procedures for
Samples Collected at the CARECO Facility

Parameter	No. and Type of Container[a] (per sample)	Preservation	Holding Time[b]
WATER (3)			
CLP Target Compound List Metals			
Total	1 liter, P	HNO_3 to pH 2	6 months, except Hg--28 days
Priority Pollutant - Organics			
Extractables base/neutrals and acids	1-4 liter, G (amber colored), Teflon-lined cap	Cool, 4°C	7 days until extraction, 40 days after extraction
Purgeables[c] (VOA)	2-40 ml, G Teflon-lined cap	Cool, 4°C HCL to pH 2	14 days
SOIL (26)			
CLP Target Compound List Metals			
Total	1-8 ounce, G	Cool, 4°C	6 months

Table 3

Preservation and Handling Procedures for
Samples Collected at the CARECO Facility
(Continued)

Parameter	No. and Type of Container[a] (per sample)	Preservation	Holding Time[b]
SOIL (con't)			
Priority Pollutant - Organics			
Extractables base/neutrals and acids	1-8 ounce, G	Cool, 4°C	7 days until extraction, 40 days analyze
Purgeables[c] (VOA)	2-40 ml, G	Cool, 4°C	7 days

a P = Polyethylene, G = Glass

b The holding times are those listed in Technical Additions to Methods for Chemical Analysis of Water and Wastes, EPA-600/4-82-055, Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057 (water) and Generic Field Operations Plan for RFA Sampling Visits, October, 1988, EPA Contract No. 68-01-7250; Work Assignment No. 49-2K00 (soil). For purposes of data validation, holding times are defined from the time of sample collection to time of sample analysis/extraction.

c Vial must be full and free of headspace.

6.5.1 Special Considerations

Soil samples will be kept from the direct sunlight and cooled to 4° C.

6.6 Recordkeeping, Documentation, and Transportation

The locations from which samples are collected will be documented. In addition, all samples collected will be labeled in a clear and precise way for proper identification in the field and tracking in the laboratory. The documents used during the SV consist of the individualized sample labels, a field logbook, and a chain-of-custody/field tracking record. In order to ensure accountability, these documents will be appropriately cross-coded with a unique identifier. The following is a hypothetical example of such an identifier:

51729 - 09

where:

51729 - corresponds to the project code designated for the specific SV;

09 - corresponds to the 9th sampling location visited during the course of the SV.

There will be no erasures permitted in any of the documents. Instead, all entries warranting correction will be stricken with a single line and accompanied by the date and initials of the sampling representative.

In order to preserve the integrity of the sample(s) from the time of collection until reception at the laboratory, sample seals will be used in conjunction with standardized sample transportation procedures.

All chain-of-custody, traffic report forms, sample labels and custody seals will be filled out completely, accurately, and legibly. All information needed to correctly and easily associate all QC samples with appropriate environmental samples will be part of the data validation deliverable package.

6.6.1 Documentation of Sampling Locations

Whenever samples are collected, the location from which the sample was taken will be verified. Photographs will be used to document sampling sites and to verify any written descriptions entered in the field logbook. If photographs are not applicable to the situation, the method of triangularization will be used in conjunction with permanent structures or other benchmarks to document sampling locations.

6.6.2 Field Logbook

The field logbook will contain all pertinent SV information, observations/information not included in the chain-of-custody/standardized field tracking form document and any deviations in protocol from the prescribed sampling plan. This information may include descriptions of the SWMU being sampled and any factors or conditions which might affect sampling procedures (prevailing weather, sampling terrain, etc.), and hence, subsequent analytical results. All routine measurements and observations that are derived (e.g., temperature, dissolved oxygen and pH) will be recorded in the field logbook, including, but not limited to, sampling blanks, static water depths, bore hole volumes, soil core descriptions, and pertinent colors and odors.

6.6.3 Photographs

Photographs will be taken which indicate areas of potential release locations, and sampling activities. Photographs are important in documenting potential environmental problems and to document that sampling procedures were properly followed. Whenever samples are collected, photographs will be taken for each step in the process to verify and complement the written description in the field logbook. Photographs will be taken of each soil sampling location prior to disturbing the soil as well as once the sample is taken. In addition, one photograph will be taken of each

soil sample and the sample will be described on the soil description form. The following information must be written in the logbook whenever a photograph is taken:

1. Time, date, location, and, if appropriate, weather conditions;
2. Complete description or identification of the subject in the photograph and reason why the photograph was taken;
3. The sequential number of the photograph and film-roll number; and
4. Name of person taking photograph.

In addition, procedures which greatly aid in the interpretation of what each photograph depicts are to:

1. Prepare a site sketch in addition to the one used to depict sampling locations.
2. Enter on the sketch a notation for each photograph which consists of:
   - O Location of photographer for each photograph;
   - # Number of each photograph;
   - -| Direction photographer was facing for each photograph (the absence of an arrow indicates that the camera was pointed down for that particular photograph).

To avoid possible confusion, the film developer should be instructed to not cut the rolls of photographs or negatives. Project personnel can then enter the information on the backs of the photographs before the rolls are separated into individual photographs or negatives.

6.6.4 Chain-of-Custody/Field Tracking Record

To establish documentation necessary to track sample possession from the time of collection, a chain-of-custody record will be filled out and accompany any sample or sample group transported for laboratory analysis. A carbon copy

of this document will be retained by the field sampling personnel. This form will then serve as the field tracking record or cross-reference to the specific analytical procedures requested for each sample on the chain-of-custody record. The record will contain the following information:

1. The sample identification number specific for each sample collected;
2. The date and time that each sample was collected;
3. The size and material of the sample container used for each collected sample;
4. The specific sample type (e.g., water, soil, air);
5. Applicable sample preservation;
6. Parameters requested for analysis;
7. Signature of person(s) involved in the chain of possession; and
8. Inclusive dates of possession.

The chain-of-custody record will be placed in a waterproof bag and taped to the underside of the lid of the ice chest being used for sample transportation. An updated, signed copy of the chain-of-custody record, completed by the receiving laboratory, will be requested by the field sampling team. An example of the chain-of-custody/field tracking record is provided as Figure 2.

Chain-of-custody of sample containers from the time of their cleaning or issuance will consist of:

1. All sample containers will be containers purchased from I-Chem Research.
2. Seals will be placed on both closures of all boxes of I-Chem containers.

FIGURE 2

CHAIN OF CUSTODY RECORD

ENVIRONMENTAL PROTECTION AGENCY – REGION II
Environmental Services Division
EDISON, NEW JERSEY 08817

Name of Unit and Address:		
Sample Number	**Number of Containers**	**Description of Samples**

Person Assuming Responsibility for Sample: | Time | Date

Sample Number	Relinquished By:	Received By:	Time	Date	Reason for Change of Custody
Sample Number	Relinquished By:	Received By:	Time	Date	Reason for Change of Custody
Sample Number	Relinquished By:	Received By:	Time	Date	Reason for Change of Custody
Sample Number	Relinquished By:	Received By:	Time	Date	Reason for Change of Custody

Page No.

3. A notation will be made in the field logbook concerning integrity of seals when a box is opened.

4. If a partial box of containers remains at the end of a sampling episode, the box will be resealed until needed.

6.6.5 Sample Labels

A legible label providing the specific sample identification code will be affixed to each sample container. The labels will be sufficiently durable to remain legible even when wet and, in addition to the sample identification code, will contain the date of sample collection and the signature of the collector. Specific analytical services for each sample will be derived from the chain-of-custody report.

6.6.6 Sample Seals

Sample seals will consist of narrow strips of adhesive material that will be used to demonstrate that no tampering has occurred. They are not intended for use on individual sample containers, but on the sample transport container(s) not possessing a lock.

6.6.7 Sample Transportation

Samples transported off-site will be packaged for shipment in compliance with current Department of Transportation (DOT) and commercial carrier regulations. Samples will be placed in an ice chest by field personnel. Following collection, samples will be delivered to the laboratory as quickly as possible. In addition, the completed chain-of-custody records, laboratory analysis request forms, and any other shipping/sample documentation accompanying the shipment will be enclosed in a waterproof plastic bag and taped to the underside of the ice chest lid.

6.7 Data Validation

All analytical data will be validated using the most current EPA Region II protocols.

7.0 HEALTH AND SAFETY PLAN

Consistent with the need for conducting the RFA SV in accordance with the stated Quality Assurance/Quality Control protocols is the need for the RFA SV to be conducted in accordance with accepted health and safety practices. The intent of the RFA SV health and safety plan is to ensure that the health and safety of the sampling team members are not threatened in any fashion by either site conditions or the conduct of the sampling program.

This health and safety plan consists of two sections: (1) a general overview of the A. T. Kearney team health and safety approach to any field site and (2) health and safety procedures specific to the individual site and applicable procedures for personnel performing sampling duties.

The basis for development of the site health and safety plan is A.T. Kearney's Safety and Health program and an evaluation of site-specific conditions as presented in the PR/VSI reports. The plan will provide at a minimum for the physiological fitness of the team's members, personal protective equipment (PPE) requirements, orientation, and emergency response procedures.

7.1 Health and Safety Plan Components

There are seven (7) "key" components to a site health and safety plan. They are:

- Project Information
- Personnel
- Site Evaluation
- Orientation
- Personal Protective Equipment
- Emergency Procedures
- Special Instructions

In addition to the stated "key" components, the nature of a sampling expedition entails several other considerations to be addressed in the development of a site health and safety plan. They are:

- Entry Objective(s)
- Control Procedures
- Work Zone Delineation
- Decontamination

7.1.1 Project Information

This health and safety plan has been prepared as a critical component of an RFA SV Protocol for EPA Contract 68-01-7038, Work Assignment No. R02-01-57. The RFA SV is to be conducted at the CARECO facility located in Bayamon, Puerto Rico.

7.1.2 Personnel

The personnel who will participate in the CARECO RFA SV are listed in Section 2.0, Table 1. Table 1 provides each team member's name, affiliation, project title and a brief description of the responsibilities associated with their assigned role(s).

Each member of the project team has been selected based on his/her qualifications and experience in all aspects of field sampling techniques and procedures. Prior to project members visiting the site, the A. T. Kearney team Health and Safety Manager must review the Health and Safety Plan for adequacy and grant approval to each individual of the project team.

The minimum qualifications are:

- o Participation in the Occupational Health Monitoring program including a comprehensive medical examination by a competent occupational physician.

- o Successful completion of an extensive health and safety training course.

- o Instruction of personnel in the proper use of personal protective equipment (PPE) including fit testing of respirators.7.1.3 Site Safety and Health Evaluation

A brief description of the site, its current and former operations is provided in Section 1.0, Introduction and Section 3.0, Site Background.

7.1.3 Site Safety and Health Evaluation

A brief description of the site, its current and former operations is provided in Section 3.0, Site Background. Additional information is provided in Section 4.0, Sampling Criteria.

A review of the PR/VSI report indicates that the CARECO site is an operating petroleum refinery. It has been in operation since 1969, processing virgin crude to produce lube base stocks, oils, aromatic extracts, slack wax and sulfur.

The SV protocol (Section 4.0) calls for sampling in the immediate vicinity of both inactive/closed and active solid waste management units (SWMUs). Thus, coordination of the sampling team's efforts with plant management is critical to the success of the sampling visit in general and the health and safety plan in particular. Of concern in the health and safety plan development is not only the hazardous waste or constituents at SWMUs that are the focus of the SV, but also plant operations that may present either physical and/or chemical hazards to members of the sampling team. Limited information is available relative to the nature of site operations and any inherent hazards associated with them. This Health and Safety Plan has been developed consistent with accepted health and safety procedures for the petrochemical industry in a fashion, flexible enough to accommodate any safety and health procedures mandated by plant management.

7.1.4 Orientation

As previously stated, each field team member was selected based upon his/her qualifications and experience in field sampling techniques and procedures, as well as his/her medical fitness to wear personal protective equipment, including respiratory protection, and to work in potentially hazardous environments. Strategic and proper selection of personnel is a critical component in the success of the overall project, and the effectiveness of the project's health and safety plan.

While each team member will have a demonstrated familiarity with the operational techniques to be employed and the Quality Assurance/Quality Control protocols to be followed, each member will participate in a orientation session prior to commencing the SV. An outline of the training is as follows:

- Project Goal(s)/Objective(s)
- Safety and Health Requirements
- Quality Assurance/Quality Control
- Sampling Procedures

More specific information to be covered for each of the designated topics other than health and safety is provided elsewhere in this SV plan. Health and safety orientation will consist of the following:

- Verification by the Health and Safety Manager or team leader that each member is medically qualified to participate in this project.
- Verification by the field team leader that each member has the appropriate complement of personal protective equipment and has been trained in its use and care.
- Verification by the field team leader that each member has had an opportunity to review the health and safety plan and is familiar with procedures that must be exercised on-site.

7.1.5 Personal Protective Equipment

The selective use of the appropriate personal protective equipment will afford the field team their primary physical means of protection against any potential hazards they may encounter in the conduct of this SV. Each field team member will be equipped consistent with Appendix II.

All SV activities will require at a minimum Level D personal protective equipment. Level D provides for the basic work uniform, and requires that foot, head, and eye protection conforming to applicable standards be worn. It affords a minimum level of protection, suitable for very limited field activities.

All field sampling activities will be conducted in a modified Level D category of PPE. This selection is predicated upon a review of site conditions described in the PR/VSI report; the nature of the proposed sampling activities; a review of the literature relative to the associated toxicity; routes of exposure; and recommended personal protective equipment for the compounds believed to have been previously managed as a hazardous waste at the CARECO site.

The modified Level D equipment will be complimented with latex gloves (disposable) and a dual cartridge, air purifying half mask respirator, equipped with organic vapor/acid gas cartridges. The respirator will be carried at all times for escape purposes.

The use of the designated respiratory protection will be deemed optional except in the event that either plant standard operating procedure requires such equipment or that the air monitoring indicates elevated levels of VOCs are present.

Due to the increased physiological heat load that the personal protective equipment requirements will impose on field team members, each member must be aware of the potential for heat stress, particularly in a tropical climate such as that encountered in Puerto Rico.

7.1.6 Emergency Response

Emergency response procedures will be existing procedures at the CARECO facility. The field team leader will be responsible to ensure that each member of his team is briefed on these procedures. If in the professional opinion of the field team leader or the field QA/QC and the Site Safety Officer, the existing facility procedures do not afford the sampling team adequate protection, it will be necessary to develop alternative procedures to address the identified deficiencies.

The sampling team will be equipped to be as self sufficient as possible. Such emergency response items as first aid supplies and a fire extinguisher will be available in the field vehicle utilized to transport the team and their equipment.

7.1.7 Special Instructions

It is not anticipated that any special instructions will be necessary for this health and safety plan. Any applicable plant SOPs that do not correlate with any section of this plan, would be incorporated here. The field team leader or field QA/QC and safety and health officer will determine the need for any additions or special instructions once an initial reconnaissance of site conditions has been conducted.

7.1.8 Entry Objectives

The entry objectives for this SV are stated in Section 1.0, Introduction and Section 4.0, Sampling Criteria.

7.1.9 Control Procedures

Control procedures for this sampling effort will be predicated upon existing facility procedures.

7.2 Work Zone Delineation

The intent of work zone delineation is to establish clear "corridors" through which workers pass either while entering or egressing contaminated areas. It ensures that workers are properly equipped when entering contaminated areas and further attempts to eliminate the inadvertent contamination of previously noncontaminated areas.

Work zone delineation will be predicated upon existing facility procedures. With respect to each sampling location, quality control measures will be followed to ensure that field quality assurance objectives are met. The potential for field cross contamination will be minimized by establishing a procedure at each location to accomplish such tasks as staging decontaminated sampling equipment and PPE, establishment of the sampling area itself, temporary staging of contaminated equipment and establishment of a decontamination area.

7.2.1 Decontamination

Decontamination of articles of PPE and sampling equipment serves the dual purpose of ensuring the health and safety of field team members and minimizing the potential for field cross contamination of samples. Decontamination for the purposes of quality assurance/quality control is described in Section 6. Decontamination for health and safety purposes will follow essentially the same principles as outlined in Section 6.0, but will focus on PPE removal and decontamination or disposal procedures and personal hygiene practices (i.e., showering, etc.).

7.3 Appendices

The health and safety appendices are attached on the following pages.

APPENDIX I

MEDICAL SURVEILLANCE PROGRAM

All A. T. Kearney team staff, who may be assigned project tasks involving field inspections, sampling or monitoring activities, are required to successfully complete a comprehensive multiphasic physical examination, prior to conducting field activities. In addition, periodic re-examination will also be required, at a minimum, on an annual basis or as otherwise directed by the examining physician. Termination examinations are also required when a program participant leaves the employ of the group. The protocol to be followed by the administering physician is as follows:

- Complete Medical/Occupational History
- Comprehensive Physical Examination
- Complete Blood Count (CBC) with Differential and Platelets
- SMAC 24 Chemistry Profile
- PolyChlorinated Biphenyls (PCB) Scan
- Red Blood Cell (RBC) Cholinesterase
- Chest X-Ray (Posteroanterion view)
- Pulmonary Function Test (spirometry)
- Electro-Cardiogram (EKG) - 12 lead resting
- Routine Urinalysis
- Audiometry
- Vision Screening

The examination is to be administered by or under the direction of a licensed, board certified occupational health physician. The final report must include the physician's opinion as to the examined individuals' fitness to wear respiratory protection equipment and other types of personal protective equipment.

APPENDIX II

LEVELS OF PROTECTION

This Appendix outlines the commonly accepted components of the 5 levels of protection utilized in hazardous waste site investigations and remedial actions.

Level A

Level A protection (a fully encapsulating suit) is used when percutaneous hazards exist or when there is no known data that positively rule out percutaneous hazards. Since Level A protection is extremely physiologically and psychologically stressful, the decision to use this protection must be carefully considered. The following conditions suggest a need for Level A protection:

1. Confined facilities where probability of skin contact is high.

2. Sites containing known percutaneous hazards.

3. Sites with no established history to rule out percutaneous hazards.

4. Atmosphere immediately dangerous to life and health--skin absorption route.

5. Site exhibiting signs of acute mammalian toxicity (e.g., dead animals, human illnesses associated with past entry onto the site).

6. Sites at which sealed drums of unknown material must be opened.

The following items constitute Level A protection:

- o Open circuit, pressure-demand SCBA
- o Totally encapsulating suit
- o Gloves, inner (surgical type)
- o Gloves, outer, chemical protective
- o Boots, chemical protective, steel toe and shank
- o Radiation detector
- o Thermal-luminescent dose (TLD) badge
- o Communications

Level B

Level B protection is required when the highest level of respiratory protection is needed, but hazardous material exposure to the few unprotected areas of the body (i.e., the back of the neck) is unlikely.

Personal Protective Equipment for Level B includes:

- o Open circuit, pressure-demand SCBA
- o Chemical protective
  - Overalls and long-sleeved jacket
  - Coveralls
- o Gloves, inner (surgical type)
- o Gloves, outer, chemical protective
- o Boots, chemical protective, steel toe and shank
- o Radiation detector
- o TLD badge
- o Communications Optional

Level C

Level C protection is required when the level of respiratory protection is reasonably assumed not to be greater than the level of protection afforded by air purifying respirators, and hazardous material exposure to the few unprotected areas of the body (i.e., the back of the neck) is unlikely. Level C may require carrying an emergency escape respirator.

Personal Protective Equipment for Level C includes:

- o Full facepiece air-purifying respirator
- o Emergency escape respirator (carried, optional)
- o Chemical protective
  - Overalls and long-sleeved jacket, or
  - Coveralls
- o Gloves, inner (surgical type)
- o Gloves, outer, chemical protective
- o Boots, chemical protective, steel toe and shank
- o Radiation detector
- o TLD badge

Level D

Level D is the basic work uniform.

Personal Protective Equipment for Level D includes:

- o Coveralls
- o Safety boots/shoes
- o Safety glasses
- o Hard hat with optional faceshield
- o Radiation detector
- o TLD badge

Level E

Level E protection is used when radioactivity above 10mr/hr is observed or detected on a hazardous waste site. Procedure is to immediately evacuate to a safe distance (2mr/hr level). Radiological safety experts available through the ZPDM must be consulted to determine adequate safety and sampling equipment, protective gear, monitoring methods, handling procedures, and remedial options.

Personal Protective Equipment for Level E includes:

- o Coveralls
- o Air purifying respirator
- o Time limits on exposure
- o Appropriate dermal protection for type of radiation present
- o Radiation dosage monitoring

APPENDIX III

STANDARD PERSONAL PROTECTIVE EQUIPMENT POLICY

This Appendix outlines A. T. Kearney's Standard Personal Protective Equipment Requirements to be followed in the execution of a VSI, SV or RI. It provides minimum guidelines only; the WAM or field team leader must exercise professional judgement as to the adequacy of the level of protection provided by these guidelines, relative to the known or potential exposures to the field team members at a given site.

At a minimum, field team members conducting a VSI, SV or RI will be equipped as follows:

Level D

- Cotton/cotton blend pants

- Cotton/cotton blend long sleeve shirt

- Steel toe boots/shoes of substantial construction. Neoprene or Nitrile gloves, steel toe boots may be worn for ease of decontamination. Disposable "nuke" boots may be worn over leather boots. All foot protection must conform with ANSI Z41-1983.

- Hard hat (ANSI Z89.1-1981)

- Safety glasses with side shields (ANSI Z87.1-1979)

In addition to the level D equipment, all field team members should be equipped with a field bag containing the following PPE:

- Half face piece, dual cartridge respirator, with a general selection of multipurpose cartridges and conform and be approved by the National Institute for Occupational Safety and Health and/or the Mine Safety and Health Administration (NIOSH/MSHA).
- Disposable Tyvek jump suit
- Disposable Polyethylene "nuke" boots
- Disposable Latex gloves
- Nitrile or Neoprene gloves
- Disposable ear plugs
- Duct tape (for securing pant legs ankle/wrist openings), if necessary
- Spare Parts Kit for respirator (optional)
- Pocket knife (optional)

NOTE: The WAM or field team leader will be issued the HNU-PID with the calibration kit and a small tool kit. Each team member is responsible for the care, maintenance and replenishment of the PPE issued to them. Common sense should prevail with respect to selection of personal clothing articles to be worn in the field. Women should not wear skirts, dresses, or nylons. High heeled, open toe/ankle shoes also should not be worn. Clothing should not be oversized or loose/floppy.

ATTACHMENT B

ANALYTE-FREE WATER ANALYSIS

Rio Piedras, Puerto Rico 00931

ANALISIS QUIMICOS

PRODUCTO : AGUA DESTILADA- CERTIFICADA
FECHA : MAR 20/10/89
NO. LOTE : UAD 89 - 1

RESULTADOS

1. Conductividad - ~~10 megohm-cm~~ 5 Megohm - cm S.G
2. pH - 7
3. Chloride - No opalescence was produced
4. Sulfate - No turbidity was produced
5. Ammonia - Meets the U.S.P. tests
6. Calcium - No turbidity was produced
7. Carbon Dioxide - The mixture remains clear
8. Heavy Metals - Meets the U.S.P. tests
9. Oxidizable Substances - the pink color does not completely disappear.
10. Total Solids - Not more than 0.001%
11. Copper - Not Detectable
12. Silicate - Not Detectable
13. Bacteriological Purity - Meets the requirements of U.S.P., CAP, ACS, (ASTM) and NCCLS.
14. Inspeccion Física - Clear, odorless liquid, colorles

Carmen J. Muñiz Cruz
Supervisora Laboratorio

Samuel Gilsao Jr.
Jefe Laboratorio